3 FIELD AND CENTER OPERATIONS

The greatest impact AWIPS has within the NWS is on field forecast and warning operations, since it will be replacing a number of legacy systems and applications within these offices as well as modifying the way forecasts, guidance products, and warnings are prepared and issued to the world of users. Appendix D delineates the types of products associated with each NWS service area.

Before the AWIPS can be commissioned, each operational staff member needs to be trained and become proficient in the use of AWIPS. Offices also need their full complement of Stage 2 forecasters, hydrologists, hydrometeorological technicians, and electronic support staffs.

The areas described below will be validated during the commissioning evaluation phase. Specific details for each area are documented in Addendum I, Appendix A, which delineates the commissioning evaluation criteria used by each office.

3.1 NWSFO and NWSO Operations

AWIPS replaces the current method of analysis, preparation, and distribution of weather-related warning and forecast functions. AWIPS also replaces several legacy systems and communication networks and becomes the "primary" system for performing these functions at the time of commissioning. Examples of the types of operations impacted by AWIPS are in the following sections.

NWSFOs and NWSOs are also impacted in terms of their final County Warning and Forecast Area (CWFA), which will transfer either prior to, or just around, the time of the AWIPS commissioning event. Specifically, the forecast zones and marine forecasts now issued by a NWSFO will be performed by their spin-up NWSOs.

3.1.1 Forecasting and Analysis Functions

The forecast staff uses AWIPS to perform a host of forecast and analysis functions in the conduct of their duties. AWIPS integrates data sets and products collected from a variety of systems (satellite, WSR-88D, ASOS, upper-air, etc.) In addition, a number of NWP models, are made available to the forecast staff for developing official NWS products. The Local AWIPS MOS Program (LAMP) is used by each site in preparing forecasts. Displays of gridded products offer the forecast staff the ability to analyze the atmosphere more comprehensively than ever before. Map backgrounds supporting these displays must be correct.

The Product Maker feature allows the forecaster to "customize" new products using mathematical techniques. Skew-T, log-p interactive upper-air diagrams, cross-sections, and other techniques support the analysis and forecast process. Forecasters define work sessions around a suite of functions using user-defined procedures. This capability allows the forecast staff to perform efficiently in the conduct of their shift work by activating and loading the necessary forecast tools. Although there will be selective portions of the ICWF system in place to support the CRS and

Terminal Aerodrome Forecast (TAF) monitoring function, there is no commissioning requirement for introducing the full ICWF functionality at Build 4.2.

3.1.2 General System Function

There are a number of system functions inherent to all AWIPS that must be deemed stable for a significant period of time to ensure reliable operations. Functions to be verified include:

- Localization of site-specific data
- AWIPS displays, images, e.g., animation features
- Color schemes, cursor control, etc.
- Decoders functioning properly
- Management of the database
- Printers

A critical area to be validated is the ability of the NCF to support operations during all types of weather situations and system difficulties. This support includes its ability to monitor individual AWIPS operational sites and troubleshoot problems in a timely fashion. Other features of this monitoring involve security access violations, equipment configuration changes, and disk and central processing unit (CPU) utilization. Refer to Appendix I-A of Addendum I for more details.

3.1.3 WFO Hydrologic Function

AWIPS must demonstrate, during the commissioning phase, the ability of a NWSFO or NWSO to perform their Hydrologic function with AWIPS. The AWIPS display functions and WHFS are used to perform core public hydrologic forecast and warning duties. Selected features of AWIPS are used to generate products used by the RFC in their preparation of river forecast products, such as digital precipitation arrays. Production of a bios-corrected, multi-sensor precipitation estimation involves the use of the integrated WSR-88D and gauge data along with other data sets (such as MESONET).

3.1.4 Product Generation/Transmission Functions

After the forecast staff complete their analysis of the atmosphere, AWIPS is used to prepare and distribute official NWS products through various methods, as follows:

- WAN
- CRS to NWR transmitters
- NWWS
- LDAD to local users
- Asynchronous direct links

Product preparation on AWIPS is performed through the text editor, which is also referred to as "message composition." The forecast staff prepare the forecast/warning/guidance products using established templates in the correct format. All NCEP, NWSFO, NWSO, and RFC offices must be able to demonstrate the capability to prepare these products on AWIPS and transmit them over the ACN. A new feature of AWIPS, simplifying this process, is called WARNGEN, which allows a graphic to be manipulated by the forecast staff with a short-term warning message as the ultimate output. As counties are selected, the database knows which ones encompass the warning area for inclusion into the warning. When warnings are issued over the WAN, an "acknowledgment message" returns from the NCF verifying receipt. Another feature introduced in Build 4.2 is the selective use of the ICWF system. This capability allows the forecast staff to produce a variety of products including the State Area Forecast; longer-term warnings, watches, and advisories; and selected climate products.

Official NWS products are transmitted using a World Meteorological Organization (WMO) message header for proper identification and routing over the ACN. Products routed over AFOS use the PIL. Products issued in any manner with this PIL identifier will need to be converted to the WMO header before routing over the ACN. Destinations can include another office, all sites in an RFC Basin, and/or the NCF for distribution over the SBN and NWSTG. Products can be requested from other sites using a request/reply feature available in Build 4.2. Refer to Appendix C for a complete description of the transition plan for products currently being communicated over legacy communication networks, e.g., AFOS to the AWIPS ACN.

3.1.5 Forecast Verification

One of the stated goals of the AWIPS is to improve the accuracy of weather forecasts. In order to determine whether the goal is being met, a method must exist of comparing forecasts to actual observations. This method, in effect today, is the AFOS-Era Verification (AEV) program. The AFOS-to-AWIPS transitional replacement for the AEV is referred to as the AWIPS Verification Program (AVP).

The AVP performs automated comparisons of forecasts and observations. The forecasts that can be compared to observations are:

a. Coded Cities Forecast (CCF)

b. AEV Manually Entered Forecast (MEF)

c. Nested Grid Model (NGM) Model Output Statistics (MOS) product

d. TAF product.

The public and aviation weather elements of these forecast products are compared to Meteorological Aviation Report (METAR) and Supplemental Climate Data (SCD) observations.

This allows a NWSFO or NWSO to select the sites for which verification will take place. The program also allows the office to select, for each site to be verified, the category of weather elements that are to be verified. In addition, it allows the WFO to designate the sites to be verified as either local or national. The results of the verification of a national site are formatted into messages transmitted over the WAN for analysis by the NCEP. In contrast to a national site, the results of the verification of a local site are not broadcast, but rather are retained locally. In either

case (local or national), the program allows forecasters at the office to manually inspect and edit the verification data values.

3.1.6 Legal Archive

The NWS continues to have a requirement for a local archive of the NWS official products issued from field offices over the WAN to external users. The Service Record Retention System at the National Climatic Data Center (NCDC) is the legal repository for these products. The following retention guidelines are required to meet the needs of the litigation community in the event of an accident or catastrophe:

a. A record retention period of five years—it can take five years from the time an accident or event precipitating a suit against the Government occurs to the time the related trial is completed, and/or all appeals are exhausted.

b. The capability to produce exact (authenticated), hard-copy replica of official products issued by the NWS, based on a set (or pre-determined) format, as disseminated or transmitted to external users.

c. The content and format of the individual records housed and processed within the retention system must be protected from tampering.

d. The capability to show, if required, the issuance or completion time of any individual record, when it was entered into the communication system, or when it would reasonably have been available to the user (e.g., via automated, "tamper-free" time stamps). The type of service records required by the legal community may be divided into the following three basic official NWS product groupings:

    1. Observations: observation reports originated by NWS, FAA, or DOD facilities and transmitted through the NWSTG, NOAAPORT, or equivalent. These reports may include, but are not limited to, surface observations, pilot reports, upper-air reports, radar reports, marine reports, and automated buoy observations.

    2. Forecasts: all official routine and non-routine disseminated products related to or derived from the NWS forecast and warning programs (alphanumeric and graphic format), regardless of the dissemination method.

    3. Graphics: all routine and non-routine environmental data and analysis graphics, such as surface analysis, standard layer upper-air analyses, weather depiction, radar summary, etc.; and all routine and non-routine graphics represented as official NWS forecasts, including various aviation prognostic graphics (e.g., Low-Level and High-Level Significant Weather Prognoses) produced by NCEP and other NWS facilities.

Local offices will retain their official NWS products transmitted over the WAN for a 30-day period in the event NCDC has not received them successfully. As a result, AWIPS will retain these products for this period on a rotating basis (i.e., the archive is refreshed each day for the previous 30-day period).

3.1.7 Local Applications Under AWIPS

Field offices will have to be responsible for the transition of local applications residing on different types of platforms—mostly PCs—to AWIPS. Since there are national, regional, and site-level applications that need to be modified and moved over to AWIPS, it will require a joint effort to complete this task. Nevertheless, field offices will normally perform this transition by interfacing single- or multi-function PCs/workstations into the AWIPS through one of the asynchronous ports available to the site. Other applications developed at regional or national levels will also need to be transitioned as well and may utilize other methods for interfacing with AWIPS.

3.2 RFC Operations

The role of an RFC is to provide hydrologic forecasts and guidance products for NWSFOs, NWSOs, and external users. These products include river and stream forecasts for routine high water and flood situations, flash-flood guidance for short-fused watch warning purposes, and long-term seasonal river and water-level forecasts. To perform the AWIPS features outlined above, the RFCs will use the NWSRFS as part of an integrated hydrologic forecast system. With NWSRFS, the RFC can compute short-term hydrologic forecasts, probabilistic forecasts, and develop extended streamflow predictions for medium-to-long-range probabilistic forecasts in support of real-time hydrologic forecasts as well as, perform model calibrations. The RFC receives official NWS products from each associated NWSFO and NWSO to produce composite forecasts of precipitation for the RFC area. These value-added products are transmitted over the ACN to the various NWSFOs and NWSOs and NCEP to support their operations. Refer to Appendix D for the types of official NWS products issued by an RFC.

There are 13 collocated NWSFO or NWSO/RFC sites with each having responsibility for a geographical area covering one or more river basins. Each RFC is equipped with an AWIPS (including its own LDAD) suitable for handling the associated hydrologic data and generation of all hydrologic products. The LDAD, in turn, has a feature referred to as the RFC Gateway, which services external user requests for RFC data and products.

Various communication links will be provided to permit the acquisition of gauge data, centrally processed guidance data, and related products used in developing hydrologic forecasts. RFC operations with AWIPS are covered in detail in the Office of Hydrology's *Hydrometerological Service Operations for the 1990's,* March 1996.

3.3 National Centers for Environmental Prediction Operations

The NCEP have the responsibility to provide national and international data collection, forecast and warning products, global atmospheric and oceanic model analyses, and guidance products to NWS field offices and a wide range of model-based products to the general meteorological community. The current AWIPS National Centers (NC) are:

- Camp Springs, Maryland—location of the Hydrometeorological Prediction Center (HPC), the Marine Prediction Center (MPC), the Climate Prediction Center (CPC), the Environmental Modeling Center (EMC), and NCEP Central Operations (NCO);
- Kansas City, Missouri—location of the Aviation Weather Center (AWC);
- Miami, Florida—location of the Tropical Prediction Center (TPC); and
- Norman, Oklahoma—location of the Storm Prediction Center (SPC).

There is a fifth NCEP site for which there are no current AWIPS requirements. This is the Space Environment Center (SEC) in Boulder, Colorado. Two additional sites, one each in Alaska and Hawaii, support NCEP operations. The Alaska Aviation Weather Unit (AAWU) is situated at the Anchorage NWSFO and supported by the AWC. The Pacific Hurricane Unit is an extension of the TPC; it resides at the Honolulu NWSFO.

Generally, the functions and strategies regarding AWIPS at the NCs have not changed as a result of the reorganization into the NCEP. It remains true that the NCEPs require a number of capabilities beyond those needed by a Weather Service Office (WSO) or an RFC. The forecast processes at the national level require:

- Image, observational, and model data spanning extended spatial and temporal scales;
- Output from both operational and experimental numerical weather prediction models at the full resolution, temporal, and geographic extent of the model; and
- Tools to produce manually enhanced graphic products and, eventually, grids to support AWIPS and other users.

3.4 Interoffice Connectivity

Because AWIPS' interconnectivity between field offices is quite different from legacy networks (e.g., AFOS), there must be a continuity of weather services to the external community. NWS offices must be able to communicate their official NWS products using the ACN and ensure that the offices they are supporting are receiving each others' products and data. In some cases, there may be a transition to an entirely different communication network altogether, such as at a Center Weather Service Unit (CWSU). For a description of the transition between current legacy networks and AWIPS, refer to Appendix C.

3.4.1 Between NWSFO or NWSO and Associated Offices

Since the NWSFO or NWSO is considered the parent office for the entire legacy system at CWFA, other office types, interacting with the NWSFO or NWSO must be supported in one form or another during the introduction of AWIPS. Offices falling in this category include spin-down WSOs, CWSUs, Weather Service Contract Meteorological Offices (WSCMO), which mostly perform upper-air functions, Data Collection Offices (DCO) in OCONUS regions, and residual fire weather offices (see Figure 3-1).

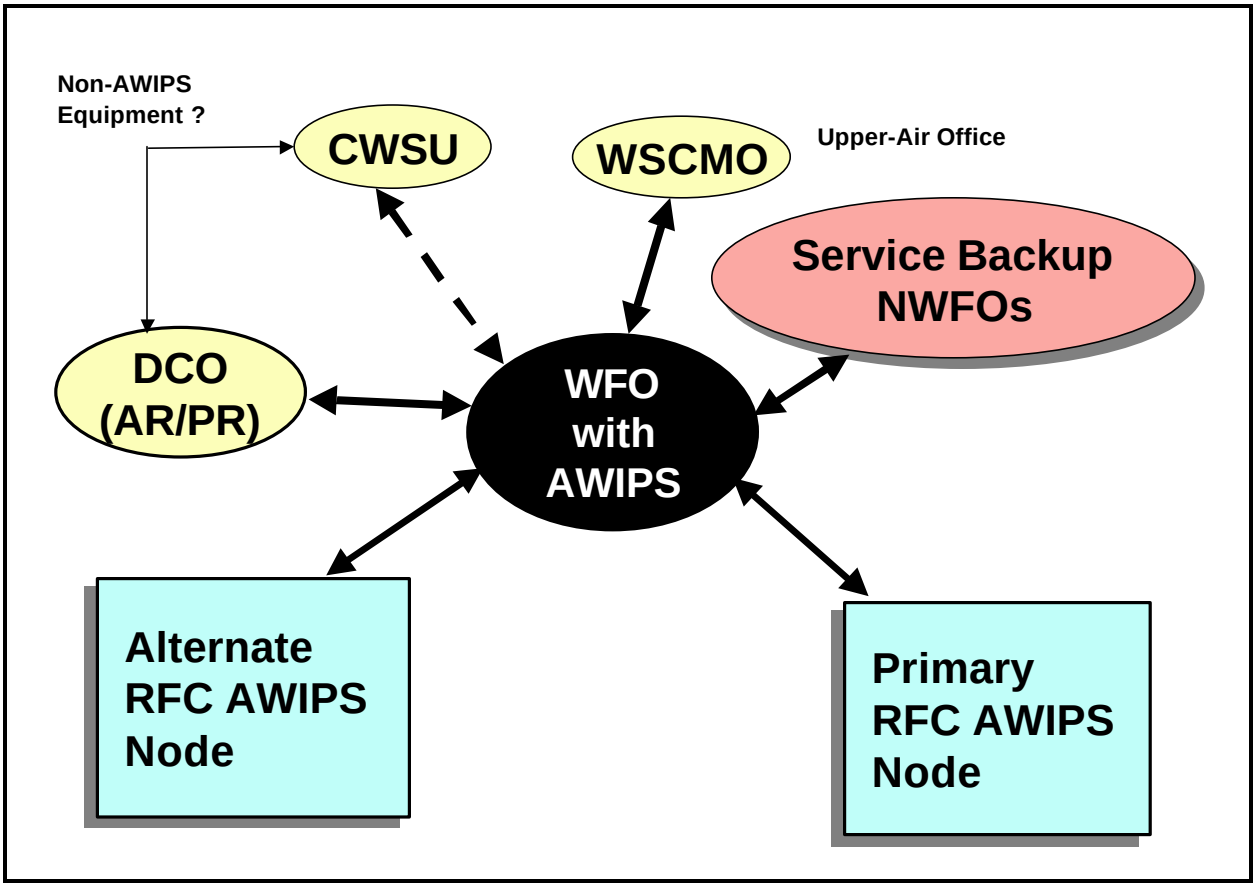

Figure 3-1 Interoffice Connectivity Required for Commissioning a WFO

With the exception of NWSOs that will become full-fledged WFOs, other offices will need connectivity to the LDAD side of AWIPS primarily for transmitting their products. In the case of the CWSU, there may not be a need for connectivity to AWIPS, since CWSUs may be migrating over to the FAA's communication network for receiving NWS products and transmitting all CWSU-generated products. DCOs in OCONUS locations do not require AWIPS equipment to perform their data collection and localized forecast functions. More than likely, these sites will continue operating as they currently do by providing the parent NWSFO with their data/products either through a direct link to AWIPS or through their legacy networks.

3.4.2 Between NWSFOs or NWSOs and CWSUs

Since CWSUs will not be receiving AWIPS equipment for the conduct of their mission, these sites must be migrated to another system. For a complete description of the transition plan for removing CWSUs dependency on legacy systems and communication networks, refer to Appendix C.

3.4.3 Between NWSFOs or NWSOs and RFCs

An RFC issues a number of forecast and guidance products to its associated NWSFOs/NWSOs, which may reside within the river basin or adjacent to it. Products received from all associated NWSFOs and NWSOs are integrated at the RFC into river basin forecast and guidance products and transmitted over the WAN back to their originating sites and to other nearby NWSFOs and NWSOs. The RFC-generated products are then used by each office to evaluate current river conditions within their domain and produce necessary hydrologic forecast and warning products.

Each NWSFO/RFC and NWSO/RFC serves as a terrestrial "network hub" for all the NWSFOs and NWSOs in its area. Routers concentrate official NWS products issued by NWSFOs and NWSOs connected to it. Priority 1 messages (i.e., warnings issued by NWSFOs and NWSOs) are retransmitted from the NCF to other NWSFOs and NWSOs. The NCF performs this retransmission along with an "acknowledgment receipt" of a message. In this way, the NWS' most important weather-related products arrive at other offices in two ways: via the WAN (see Appendix C) and the SBN broadcast. Likewise, the RFC can issue products through the WAN to locations supporting it.

The RFC in Alaska has a different configuration than shown in Figure 3-1, since this region does not have AFOS. Rather, the Alaskan RFC has a connection to ARONET, which is the equivalent of AFOS (see Appendix C). The RFC provides guidance products using AWIPS at this location.

All NWSFOs and NWSOs, the SPC, AWC, and TPC have their WAN connections through the 13 WAN hubs. Therefore, NWSFOs and NWSOs use both AFOS and AWIPS/WAN to distribute products to RFCs during the transition. As Figure 3-2 illustrates, a minimum of two NWSFOs and/or NWSOs with AWIPS WAN connections are necessary to validate:

- The ability of a NWSFO and/or NWSO to transmit all of its RFC-required products over the WAN to its associated RFC.
- The RFC's ability to transmit its river basin forecast/guidance products through the WAN to the NCF/SBN back to the receiving NWSFO and NWSO.
- The integration of products from two or more AWIPS sites into RFC-produced mosaics.

Commissioning of an RFC will demonstrate that it can (1) receive all NWSFO and NWSO-generated products, reliably, from both AWIPS and legacy systems, e.g., AFOS, ARONET, and PRONET; (2) integrate those products received into the necessary river basin forecasts/guidance products using only AWIPS to perform this function; and (3) distribute these products over the ACN/AFOS/ARONET/PRONET back to their respective offices. Commissioning criteria for the RFCs are integrated with the criteria for commissioning NWSFOs, NWSOs, and NCs in order to simplify the process. Those elements of the criteria not pertinent will not be evaluated during the evaluation phase.

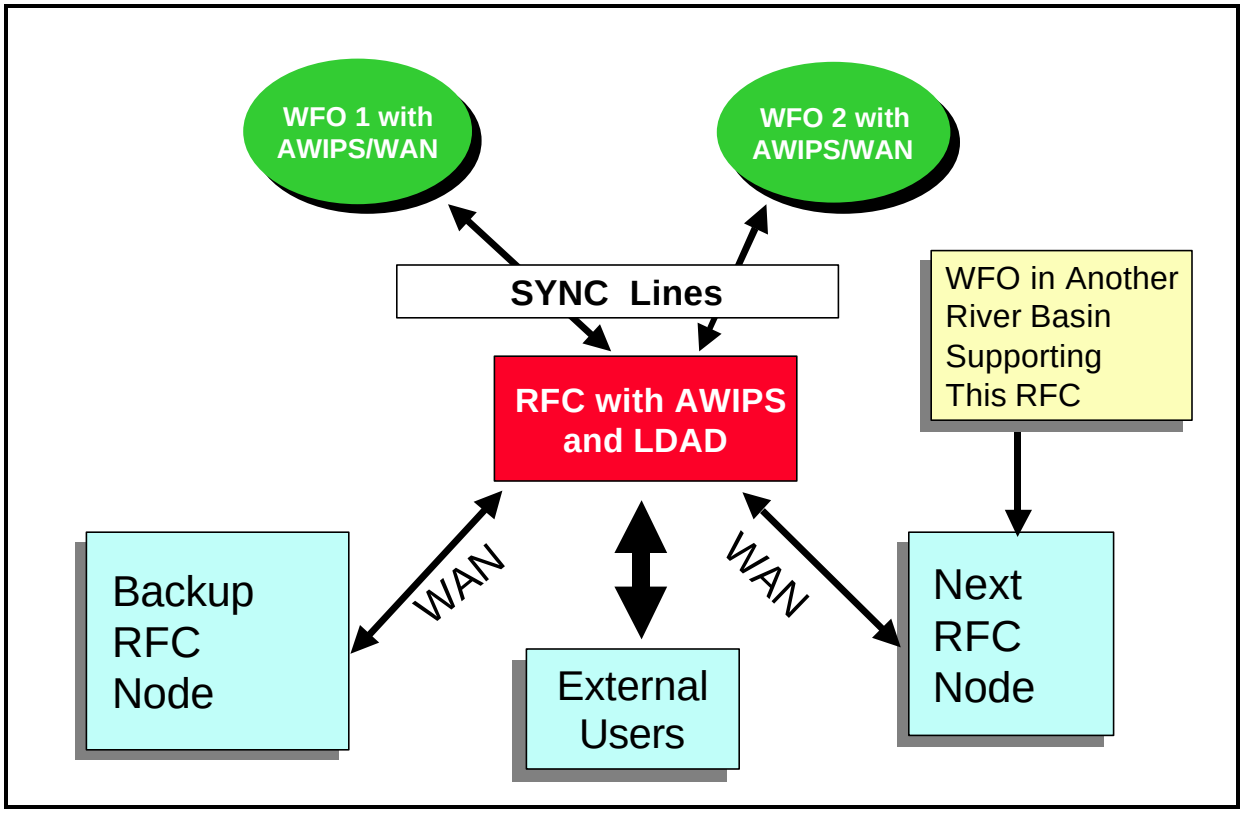

Figure 3-2 Interoffice Connectivity Required for Commissioning RFC River Basin WFOs

3.4.4 Between NCEPs and NWSFOs/NWSOs/RFCs

When AWIPS is commissioned, NCEP model guidance will follow a communication path to the local forecaster similar to today. The NCO will pass graphics to the NWSTG, where they will be forwarded to the AWIPS NCF to be disseminated via satellite broadcast to all AWIPS networks as products to be distributed from WFOs and RFCs. Local products created at the NWSFOs, NWSOs, and RFCs will be transmitted via the AWIPS terrestrial network to the NCF, through the NWSTG, to the various NCEPs.

Today, NCEP centers provide their forecast/guidance products directly to NWSFOs and NWSOs/RFCs through legacy systems as delineated in Section 3.3. Likewise, RFCs/NWSFOs and NWSOs issue their products over these same networks to the centers for producing their products. With AWIPS, the various centers will have to demonstrate, during the commissioning evaluation phase, that each can receive all required products from all NWSFOs and NWSOs/RFCs commissioned up to the time the center is performing its evaluation. This means if 10 RFCs and 20 NWSFOs and NWSOs have already been commissioned, the center must be able to demonstrate that:

- All commissioned NWSFOs and NWSOs/RFCs are able to transmit all of their NCEP-required products over the WAN to the center being evaluated, and

- The center is able to transmit its generated forecast/guidance products through the WAN to the NCF/SBN back to all commissioned NWSFOs and NWSOs/RFCs.

In addition, commissioning of an NCEP will demonstrate that the center can (1) receive all NWSFO and NWSO/RFC-generated products, reliably, from both AWIPS and other legacy systems, e.g., AFOS, Alaska, and Pacific communication links; (2) integrate those products received into the necessary forecasts/guidance products using only AWIPS to perform this function; and (3) distribute these products over the ACN/AFOS/Alaska/Pacific links back to their respective offices. Commissioning criteria for the centers are integrated with the criteria for commissioning NWSFO, NWSOs, and RFCs in order to simplify the process. Only those elements of the criteria are pertinent will be evaluated during the evaluation phase.

3.5 System and Service Backup Requirements

The commissioning criteria require that necessary backup functions are functioning properly and meet agency policy requirements. At a minimum for AWIPS, this requires that both system and service back-up requirements are being satisfied before AWIPS can be commissioned. In every case (unless so designated), the first system backup site will be identical to the service backup site.

3.5.1 System Backup

System backup relates to the AWIPS site components and those systems currently interfaced to AWIPS required to be backed-up. AWIPS has a number of redundant subsystem components as illustrated in Table 3-1. In general, degradation in the AWIPS CP, DS, AS, and individual WS would constitute **Level 1** type degradation because of their redundancy in the AWIPS.

Level 2 degradation occurs when one or more systems interfaced to AWIPS fail to communicate their products/data to the DS and, as a result, must revert to their backup mode of operation. In the case of associated radars, AWIPS must be able to dial backup radars to ensure proper coverage for the CWFA and process this information correctly. For ASOS and MicroART, these systems must have alternate offices, equipped with either AWIPS or AFOS/PC -based Asynchronous Communications Extension (PACE), to transmit their observations.

Types of degradation designated as **Level 3** include all failures associated with an AWIPS single-point-of-failure. Examples include SBN site ground station (SGS) failure (e.g., SBN CP fails) or the LDAD server fails. In each of these cases, the single-point-of-failure would cause the office to take major actions to establish even a degraded mode of operation. For example, loss of the SBN SGS would result in a complete loss of model, satellite, and official NWS products, requiring recovery in some other way.

If the office cannot recover sufficiently from this type of failure, it might result in a **Level 4** type degradation, namely, a catastrophic office failure. In this case, the office cannot carry out its stated mission and is considered to be in ***service backup*** mode (see Section 3.5.2.1).

Table 3-1 AWIPS Failure Modes

Degraded Level	*Type of Failure*	*Office Action*
Level 1	AWIPS redundant equipment (e.g., CP/DS/AS/WS fails)	NCF switches office to back-up CP/DS/AS. In addition, AS & DS can switch automatically in case of component failure. Another WS used on-site
Level 2	Primary interface fails (e.g., WSR-88D connection to AWIPS goes down)	Access to backup network radars through AWIPS
Level 3	Local SBN outage (affects forecast period)	56-kbps dial-backup (limited set of products) Request/Reply (R/R) capacity through WAN to another NWSFO and NWSO with AWIPS
Level 4	Service backup - Catastrophic failure (e.g., flooding within building)	Transfer CWFA responsibility to backup NWSFO and NWSO or RFC
Level 5	General SBN uplink or NWSTG failure	56-kbps dial-backup to 33 sites at a time. Limited products sent from NCF & NWSTG (not in software release 4.2).

The final level of backup is referred to as **Level 5**. It occurs when there is a single-point-of-failure at a national center impacting the entire AWIPS network. This level would generally pertain to the NCF MGS and its ability to transmit all required products over the NOAAPORT/SBN. With this kind of failure, the only form of backup would be to issue selected products to selected sites. The ability to distribute a limited set of point-to-multipoint (PTM) products via 56-kbps is not included in software build 4.2.

During the commissioning evaluation phase (refer to Section 4), the system backup scenarios will be evaluated for each office where AWIPS is being commissioned. This will be performed in one of two ways:

- The office experiences a level of degradation (Levels 1-3 only), or
- If the site did not experience any failure for one or more of the levels, predefined procedures, primarily from the *AWIPS Operational Test and Evaluation (OT&E) Test Plan*, will be used to verify the system's ability to perform the backup.

For example, if the ASOSs dialing the LDAD subsystem have not experienced failure, a test failure would be induced to ensure that the ASOSs can dial their backup hosts.

3.5.2 Service Backup

When an NWSFO, NWSO, RFC, or NCEP cannot carry out its mission of issuing warnings and forecasts/guidance products for its CWFA, river basin, or area of responsibility, it must move its operations to another location. As stated in Section 3.5.1, this is referred to as *service backup*,

meaning an office no longer can perform its primary function for whatever reason. Although this type of failure (Level 4) occurs rarely, it must be accounted for when commissioning the site–i.e., if operations are not transferred between offices, properly, serious problems could result.

3.5.2.1 NWSFO and NWSO Service Backup

A critical component of NWS operations is reliability. This is particularly true for NWS warning and aviation services. The reliability requirement is addressed by ensuring that each facility provides services to external users. This backup capability must be easy and quick to initiate. It must result in as little change in the level-of-service as possible for NWS customers in the area being backed-up, and minimal impact on services to customers in the areas of the office(s) providing service backup. For NWSFOs and NWSOs, a single duty forecaster and hydrometeorological technician must be capable of providing backup, at least initially. There can be no delay in the transfer of service responsibility for warnings, marine advisories, and aviation forecasts once backup is required (i.e., a "hot backup" is required for these service areas). Appendix I-D lists the proposed service backup sites.

In the event the primary office is disabled, each NWSFO and NWSO has designated backup sites identified by a Service Program to perform service backup. An NWSFO or NWSO may have several offices backing it up based on the situation at hand. It may also depend on which site is providing the best radar coverage at the time. Each site is required to serve as the backup for one or more NWSFO or NWSO that may need backing up. AWIPS equipment must be used as the primary backup-system. Therefore, during the commissioning evaluation process (see Section 4), each NWSFO and NWSO will evaluate:

- Its ability to back-up another site for the required Service Program.
- The ability of all sites covering their CWFA to back-up the NWSFO and NWSO being commissioned.

The list of backup sites for each office can be found in Appendix A. During the commissioning evaluation phase (refer to Section 4), the NWSFO and NWSO service backup scenario is carried out in one of two ways:

- The office experiences a Level 4 degradation during normal operations, or
- If the site did not experience a Level 4 failure, a predefined procedure is used to verify the service backup.

For example, if the NWSFO or NWSO was forced into a service backup (including partial backup), the office would have verified that this level can be performed. If there was no such event, the office would select one forecast period and notify its backup sites to carry out their portions of the service backup for the forecast cycle. As Figure 3-3 illustrates, the backup sites may be required to use either AWIPS (if the backup site is already commissioned) or a mix of AWIPS and legacy systems (if AWIPS has not been delivered to the site or is not commissioned).

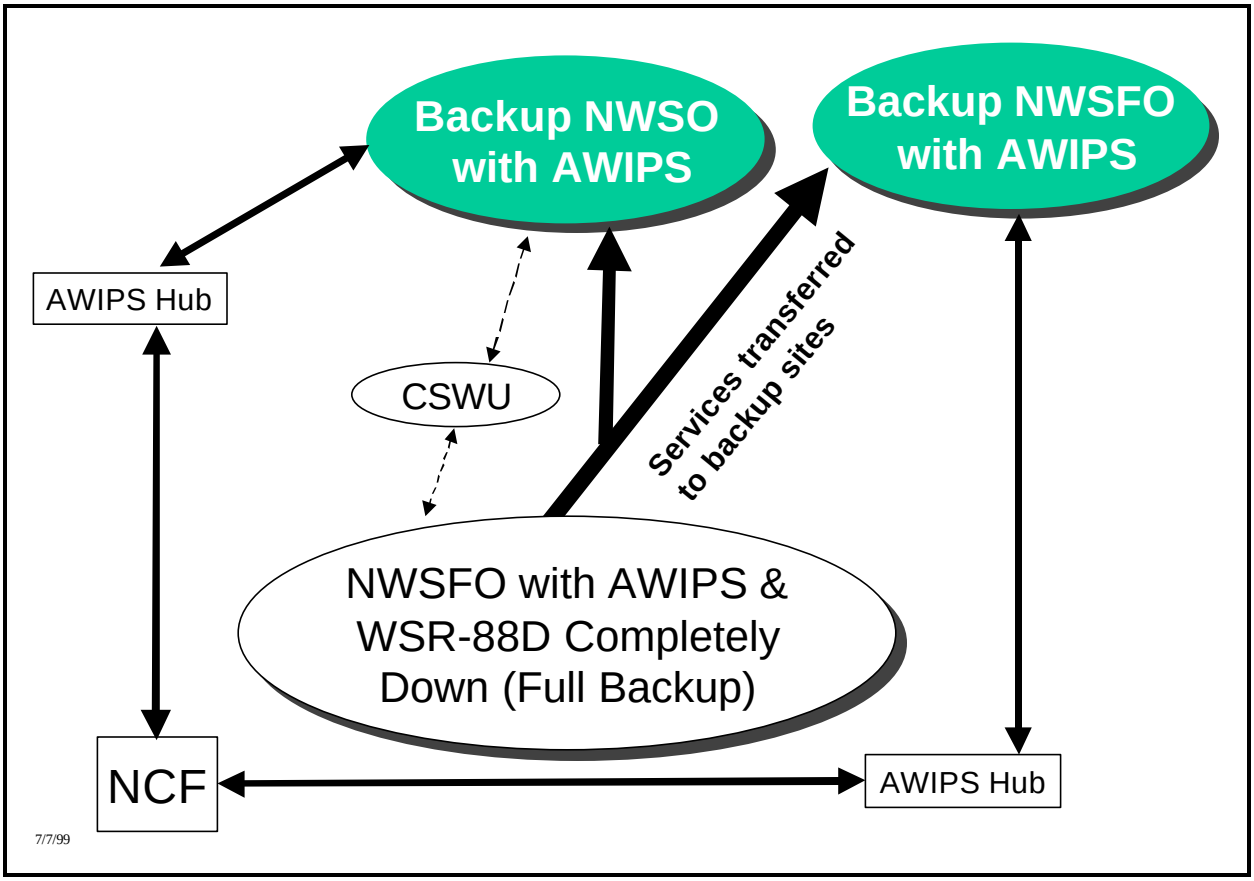

Figure 3-3 Example of Transferring AWIPS Responsibilities to Backup WFOs

3.5.2.2 RFC Service Backup

Because of the nature of the guidance/forecast products produced by RFCs, unlike NWSFOs and NWSOs having the additional function of issuing all warnings to the public, the need for immediate service backup is lessened. As a result, the requirements for service backup will be different than for NWSFOs and NWSOs.

The current plan calls for a two-tiered backup scenario as follows:

- For short-term RFC outages, NWSFO and NWSO supporting an RFC will serve as backup, within their means, to provide public hydrologic products/services normally supported by the impaired RFC. In other words, NWSFO and NWSO will continue to provide their suite of public hydrologic products using locally available models and procedures but without the support of RFCs.
- RFC forecasters may be relocated in situations where the HSAs can no longer provide adequate public hydrologic forecast and warning services without the basin-wide modeling support from an RFC (e.g., a multiple-day outage at the impaired RFC, the exact outage duration requiring backup varying with the current level of hydrologic activity).

Only the first scenario above will be tested during the commissioning evaluation to verify that NWSFO and NWSOs are able to perform the short-term backup.

3.5.2.3 NCEP Service Backup

Like RFCs, NCEP service backup will not be as involved as NWSFOs and NWSOs. Nevertheless, each NCEP receiving AWIPS must have a backup plan in place delineating the steps necessary for the backup sites to perform.

3.6 Measuring AWIPS Product Transmissions

One of the key elements of the AWIPS system is that products currently transmitted by legacy systems will be transmitted over the ACN . Examples of these include all warnings and forecasts (i.e., marine, aviation, and public), climate information, guidance products furnished by centers, and weather observations. In addition to transmission over the ACN, these products are distributed over various dissemination systems, such as NWWS, NWR/CRS, and LDAD, which are currently located within the NWSFOs and NWSOs.

3.6.1 Product Headers

Currently, NWS offices transmit their official NWS products using one of two header types:

- WMO headers, which are attached to products issued by offices not using AFOS, and
- PIL headers, which are used by offices transmitting their products over AFOS and the NWWS.

Note: The NWSTG converts all PIL headers to WMO format on products being issued to external users.

The NWS has established a policy that requires all official NWS products to be issued with a WMO header from NWS offices equipped with AWIPS. As a result, the commissioning evaluation of AWIPS will validate that official NWS products being issued have the correct headers and station identifier. The details for formatting and issuing products with these headers can be found in the *NWS Communications Identifier Policy Issuance* memo, January 1995.

When AWIPS is commissioned, only WMO headers will be applied to official NWS products for transmission over the ACN. However, since other legacy systems, such as the existing NWWS, still require the PIL format until the replacement NWWS system is fielded, AWIPS will need the capability to convert WMO headers to PIL headers for transmission over the AFOS, until the AFOS network is decommissioned. Likewise, AWIPS will continue receiving official NWS products in PIL format from other offices that have not yet commissioned their AWIPS.

3.6.2 Product Transition Plan

For a complete description of the transition plan for products presently being issued through AFOS over the ACN, refer to Appendix C.

3.6.3 Product Availability Monitoring System

The Product Availability Monitoring System (PAMS) developed by the OSO, has the intended purpose of tracking a select number of products issued by various data providers, e.g., satellite (NESDIS) , numerical weather prediction model output (NCEP), alphanumeric and graphics (NWS), and the national lightning detection system (under contract to Global Associates, Inc). As these are routed between the NWSTG, NCF, and field locations, product logs are generated and used by PAMS to meet the needs of the NORD, the Build 4.2 OT&E, and the AWIPS commissioning activities associated with assessing product availability using a variety of statistical and graphical means. The system description and NORD production sections follow.

3.6.3.1 System Description

The architecture of PAMS (see **Figure 3-4**) is centered on three major components, including: the product acquisition subsystem, currently an HP workstation; the PAMS processing system, a Pentium computer; and another computer system (i.e., server) where the Oracle data base resides. The product acquisition subsystem is responsible for acquiring the product logs from a variety of sources such as the NCF, GOES Ingest NOAAPORT Interface (GINI), and CP. NCF and CP product logs are acquired through UNIX scripts passing through the AWIPS firewall and retrieved for further processing by the PAMS processing system. GINI logs are passed to the NWS (via cc:mail attachments that are loaded into the product acquisition subsystem) and reformatted to appear like NCF logs. Additional efforts are under way to acquire product logs from the NWSTG and the data servers as well as from the AWIPS message handling system.

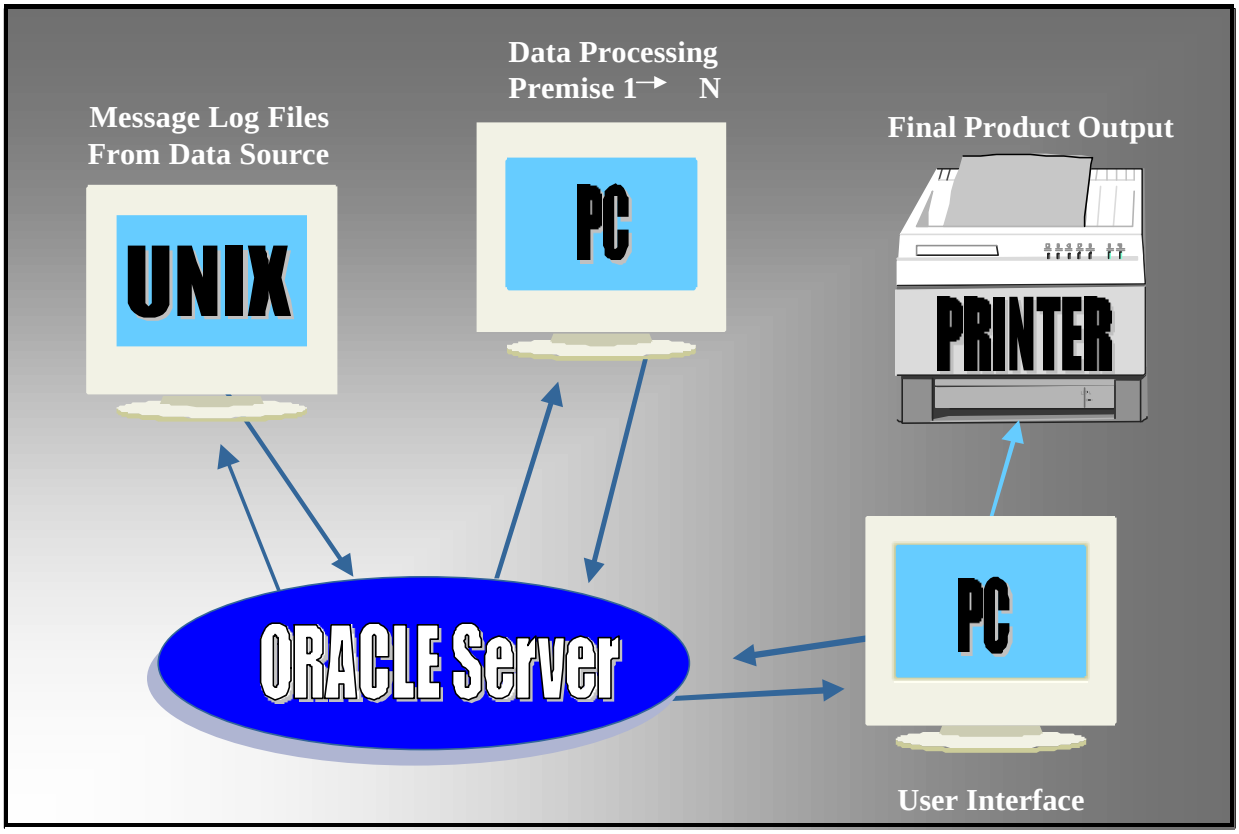

Figure 3-4 PAMS Architecture

Figure 3-5 illustrates the flow of products from the data/product centers through the NCF/NOAAPORT feed and out to the field sites. All **T** data (encapsulated within a circle after the files are acquired and preprocessed) are passed to the Oracle data base where they are organized for further processing by the PAMS processor. The key to the data-basing is the product identification, which uses the WMO header. Besides the header, files contain information concerning the date/time the product was received or sent, the size of the product issued, and other related data. An archive of all products received by the data base is routinely performed for additional long-term analysis.

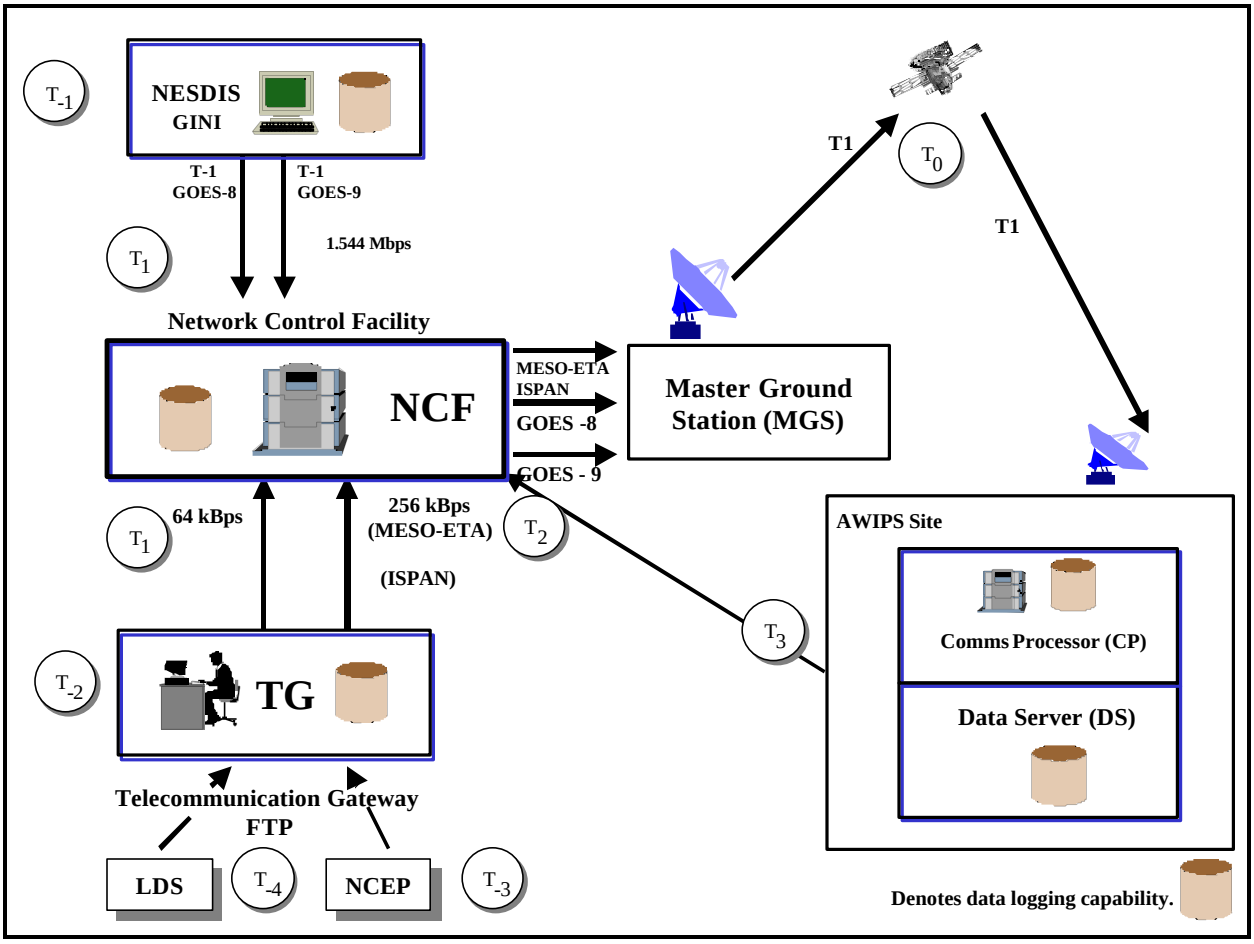

Figure 3-5 Product Flow Topology

The third stage of processing takes place via the PAMS processing function whereby the Oracle data base is queried by the user and processed into ASCII files accessible by a QUATTRO PRO spreadsheet. The main avenue for querying the data base for the NORD is through the PAMS graphical user interface (GUI), which can be displayed on any 16-bit computer with a PAMS user account (refer to Figure 3-6 for a display of the GUI screen). The account allows access to process PAMS data through the GUI. When an account is activated, the user accesses the GUI and queries the data base using a technique called ***Premises***. Premises are statements about the

throughput of NWS products that are evaluated through statistical/graphical means. For example, one Premise provides statistical data on products flowing through the NCF, another Premise looks at the statistics from the NCF to selected field sites, and another one evaluates performance from the field office to the NCF. Product categories queried include selected satellite, NCEP model, alphanumeric text, and lightning. These products are then processed for the dates requested and the output is sent to a text-formatted file for use by the spreadsheet.

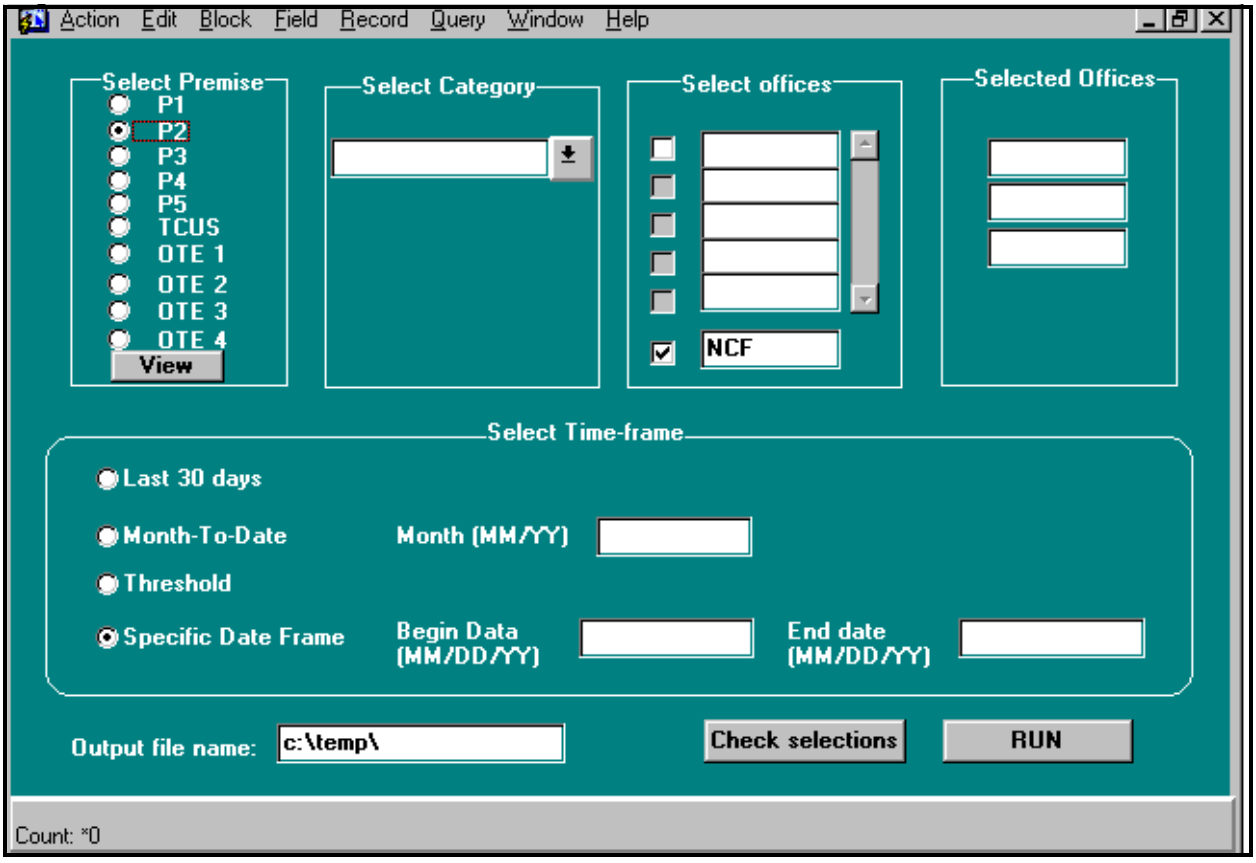

Figure 3-6 PAMS Input Screen

3.6.3.2 NOAAPORT Operational Readiness Demonstration

The NORD is an evaluation of the satellite broadcast feed (refer to Section 2.3.3) to determine the operational readiness of the SBN to support operations. The *NORD Report* contains the requirements and criteria for evaluating the readiness of the NOAAPORT. The NORD is a precommissioning activity required before the first AWIPS can be commissioned.

For the NORD, it was requested that PAMS produce graphical outputs for inclusion in the *NORD Report*. This required further processing of the PAMS data into a special format and is included in this report. Spreadsheet data supporting the *NORD Report* are available upon request. In addition to knowing how its official products will transition, each site will validate its ability to receive adequate numbers of NOAAPORT products. This will be performed by evaluating receipt of selected products:

- Models (Aviation, ETA, Meso-ETA, etc.)
- Satellite (GOES-East or GOES-West)
- Alphanumeric Text Products (includes products issued by NWSFOs, NWSOs, RFCs, and NCEPs)
- Lightning Detection System (1-minute)

Details of the techniques and methodologies utilized to determine the availability of these products are described in the *NORD Report*.

3.6.3.3 Use During Commissioning Process

PAMS will be utilized to assist the field in ascertaining the number of products arriving on-site and to ensure that products issued from field sites are arriving at their destinations satisfactorily. This system allows the agency to measure the number and timeliness of products arriving at a particular location. Selected products will be tracked through various topological points to verify that they are being acquired at the site for a 30-day period at a rate of 98.5% or better performance. In addition, the RCM transmission over the WAN from each NWSFO or NWSO will be evaluated to meet the 96% criteria established with the WSR-88D commissioning.